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ABSTRACT

Research projects are reviewed which are representative of the Rand Corporation's education work as it affects policy, management, and research methods. Significant characteristics or results of the projects and studies are briefly described under general categories of education studies and human resources research. Education studies are grouped under the following headings: How Well Do New Approaches Work? How Do Educational Organizations Function? School finance: Problems and Remedies; Schooling, Desegregation, and Discrimination; and Other Studies (Higher Education, Education of the Handicapped, Educational Technology, and Management and Research Policy). Human resources research is discussed and recent projects are reviewed under these headings: Education and Work, Analysis of Educational Personnel Systems, and Research on Welfare Problems. Earlier human resources studies are described under three topics: Equal Opportunity, Employment and Labor Markets, and Welfare. The final section discusses what was learned about education and about human resources policies. A 90-item bibliography lists the project reports. (TA)

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EDUCATION AND HUMAN RESOURCES RESEARCH AT RAND

John Pincus and Anthony H. Pascal

January 1977

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EDUCATION AND HUMAN RESOURCES RESEARCH AT RAND

John Pincus and Anthony H. Pascal

The Rand Corporation, Santa Monica, California

I. INTRODUCTION

How do educational systems function under the political, social, and economic pressures they face? What are the results of efforts to improve schooling outcomes? How well does schooling serve people of different races and classes, and at different phases of the life cycle? What is the relationship between schooling and income? How can society fairly and economically support people who are not able to work and have little income? What are fair, efficient, and practical ways to finance schooling that helps to prepare and retrain people for their roles in life and work?

To study these and similar questions, Rand has established an interdepartmental research program for education and human resources. Current research projects are staffed by about 50 Rand professionals, or the annual equivalent of about 35 person-years. The research is policy oriented, addressing issues of education and manpower policy as faced by federal, state, and local decisionmakers. The research is also interdisciplinary, engaging the skills of educators, sociologists, economists, political scientists, psychologists, cost analysts, statisticians, operations researchers, urban planners, engineers, and computer scientists. This combination of skills allows us to be more effective in conducting research on social issues than if we followed the typical single-discipline pattern of much human resources research.

Rand's work in these fields is regularly reviewed by the Rand Education and Human Resources Advisory Board, whose members represent

a spectrum of expertise in education and manpower research and practice.

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Dean Arnold R. Weber, Graduate School of Industrial Administration, Carnegie-Mellon University

II. EDUCATION STUDIES

There are usually about a dozen Rand education and human resources research projects going on at one time. It would take too long to describe each of the seventy-odd projects carried out since 1968; instead, we will discuss representative projects, showing how they address the basic questions that the research aims to clarify.

The representative Rand project is a U.S. government research contract conducted by three of four staff members, lasting from one to two years, culminating in a research report and oral briefings for the sponsor. The study is usually addressed to one or more policy issues (How should educational finance systems be modified? How should educational innovations be implemented? How should early childhood education programs be evaluated?) and attempts to offer, on the basis of the evidence, recommendations for the more effective conduct of public affairs in a given field.

Some studies have had direct effects on policy. A study by systems scientist Roger Levien and colleagues in 1970-71 for the U.S. Office of Education offered proposals for the goals, functions, and organization of the government's proposed National Institute of Education, which would conduct and sponsor research aimed at improving education. The study was widely distributed among researchers and policymakers, and many of its elements were incorporated in the law that established the new Institute.[1]

Some studies have indirect effects on policy through their effects on research knowledge, and thereby on the climate of informed opinion. A 1972 report by economist Harvey Averch and colleagues, for the President's Commission on School Finance, reviewed the state of knowledge about how differences in educational approaches affect the outcomes of schooling. The report, entitled *How Effective is Schooling?*, concluded that no type of educational intervention discussed in the research literature was consistently beneficial for all kinds of students as measured by a variety

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[1] R. E. Levien, *National Institute of Education: Preliminary Plan for the Proposed Institute*, R-657-HEW, February 1971.

of indices. Different types of approaches to schooling were effective in some situations but not in others, without any clear evidence on why the differences took place. The report has been cited frequently in research literature and government publications and has contributed to a widely held view that there are no universally reliable formulas or quick fixes for educational reform, and that differences in spending are not necessarily associated with differences in outcomes of schooling.[1]

Other studies are aimed at managerial concerns, rather than general policy issues. Stephen Crocker, a political scientist, was project leader of a study of Title IV of the U.S. Civil Rights Act, administered by the U.S. Office of Education, which funds different forms of technical assistance in desegregation to school districts. The project staff interviewed employees of the technical assistance agencies and school districts and also mailed questionnaires to the agencies. Using these data, they made recommendations to the Office of Education about how the technical assistance agencies could better respond to school district needs. The study was basically managerial, because it focused on ways of applying the existing Title IV instruments more efficiently, rather than on developing new instruments or on examining the usefulness of Title IV itself. Such studies as this are often much valued by government agencies, because they respond directly to their need to increase efficiency or improve the decisionmaking process.[2]

A few studies are more concerned with basic research or improvement of research methods than with public policy. For example, philosopher-psychologist Tora Kay Bikson and colleagues are investigating how elderly consumers make choices among consumer products. The study, sponsored by the National Science Foundation, uses experimental methods to find out how older people organize, process, and evaluate information.

Another study, by economist Stephen Carroll and statistician Daniel Relles, sponsored by the National Institute of Education and the Lilly

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[1] H. A. Averch, S. J. Carroll, T. S. Donaldson, H. J. Kiesling, and J. Pincus, *How Effective is Schooling?*, Educational Technology Publications, Englewood Cliffs, N.J., 1974.

[2] S. Crocker, R. Crain, M. Graubard, J. Kimbrough, N. King, M. Thomas, F. Wirt, *Title IV of the Civil Rights Act of 1964: A Review of Program Operations*, R-1901-OE, September 1976.

Endowment, compared two different methods of estimating student choice among institutions of higher education, and found that a method using Bayes' theorem is preferable on economy and accuracy grounds to more commonly used methods of forecasting students' college choices. This study, in addition to offering a methodological advance, was also of potential policy value to higher education planners who must estimate the enrollment effects of student aid.[1]

Finally, Rand policy recommendations are sometimes not adopted by the sponsors. For example, in 1974 a Rand research group led by Robert Crain, a sociologist, designed a national longitudinal study of the effects of school desegregation for the U.S. Commission on Civil Rights. The design was carefully worked out and received general approval from the research community. But the study it proposed was controversial and met opposition from some members of the Commission staff; furthermore, the Civil Rights Commission did not have the funds to conduct the study, nor were other government agencies interested in collaborating in support of the study. Therefore, with the study never carried out, the policy influence of the Rand design was negligible.[2]

These projects are representative of Rand education work as it affects policy, management, and research methods. Along with other projects, they usually focus on a few major issues in American education.

The following section describes briefly Rand research projects that have been conducted on each of a number of such issues.

A. HOW WELL DO NEW APPROACHES WORK?

1. *A Program for Mexican-American Junior High School Students*

In 1966, San Jose City Schools, with the aid of Lockheed engineers, developed a curriculum based on simulation and gaming for disadvantaged

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[1] S. J. Carroll and D. A. Relles, *A Bayesian Model of Choice Among Higher Education Institutions*, R-2005-NIE/LE, June 1976.

[2] R. Crain, D. J. Armor, F. Christen, N. King, M. W. McLaughlin, G. C. Sumner, M. Thomas, J. J. Vanecko, *Design for a National Longitudinal Study of School Desegregation*, R-1516-USCCR, R-1516/1-USCCR, R-1516/2-USCCR, September 1974.

Mexican-American students in grades 7 through 9. The curriculum was tried out in one junior high school with state funding, and Rand was asked to evaluate it in respect to effectiveness and cost. The researchers, working with project leader Marjorie Rapp, an educator, developed an evaluation design and conducted the evaluation. They found that the program produced better than expected gains in math and reading, using an approach that involved motivational activities, parent involvement, and individualized instruction. The program was later disseminated nationally by the U.S. Office of Education, after five years of testing and refinement by the school district, with Rand assistance.[1]

2. *Performance Contracting: A National Survey*

During the period 1969-1972 there was considerable interest in performance contracting, a method by which private firms contract to teach in the schools in exchange for payments which increase in proportion to increases in students' achievement as measured by standardized tests. In the spring of 1970, HEW commissioned Rand to conduct a two-year study led by economist George Hall of the effects of performance contracting, focusing on eight projects in five districts around the country. The study also included preparation of a manual for school districts, advising them on the appropriate use of performance contracting. The final reports on the five cities that Rand studied intensively indicated that performance contracting was usually no more effective than conventional methods of schooling. The study reported its findings about achievement gains and about the schools' institutional responses and found that problems in both domains reflected specific types of barriers: social and behavioral, systemic, and informational. The authors made suggestions about how some of these barriers could be surmounted, but concluded: "The performance contracting experience

[1] M. L. Rapp, M. B. Carpenter, S. A. Haggart, S. Landa, G. C. Sumner, *Project R-3, San Jose, California: Evaluation of Results and Development of a Cost Model*, R-672-SJS, March 1971; M. L. Rapp, G. L. Brunner, E. M. Scheuer, *An Evaluation Design for San Jose Unified School District's Compensatory Education Program*, RM-5903-SJS, May 1969.

should have shattered any illusions that these barriers can be easily eliminated."[1]

3. *What Works Best in Compensatory Education?*

Under the joint sponsorship of the Carnegie Foundation and Rand, Herbert Kiesling, an economist, collected data on 42 compensatory education projects in 37 California school districts, and measured the relationship between resources used and children's reading progress. He found that some resources and methods consistently contributed to raising reading scores: individualized instruction by reading specialists, staff planning time, small group instruction by specialists, high ratio of managers to pupils, and planning coordination. He also found that some of the projects registered substantial reading score gains over the course of a year, which tended to contradict the view that compensatory education is not effective.[2]

4. *Vouchers and Educational Alternatives*

Since April 1972, Rand, under the successive sponsorship of the Office of Economic Opportunity and the National Institute of Education, has studied educational vouchers and other parent choice systems in education. The study began as part of an OEO effort to introduce educational vouchers into the public schools. The voucher demonstration was designed as a large-scale social innovation with a number of objectives, principally (1) improved education of children, especially disadvantaged children, (2) more parental control over education, and (3) more parental satisfaction with their children's schooling. The voucher mechanism tries to meet these ends by encouraging creation of new schools and extending the range of choices open to parents, thereby increasing school staffs' incentives to be more responsive to children's needs.

In practice, this aim turned out to be unrealistic in light of the

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[1] M. B. Carpenter-Huffman, G. R. Hall, G. C. Sumner, *Change in Education: Insights from Performance Contracting*, Ballinger Publishing Co., Cambridge, Massachusetts, 1974.

[2] H. J. Kiesling, *Input and Output in California Compensatory Education Projects*, R-781-RC/CC, October 1971.

present structure and incentives of American public schools. Only one school district in the country--Alum Rock, California--was willing to participate in the experiment. It soon became apparent that the district would be unlikely to allow private schools to compete with public schools, or public schools to compete without restriction among themselves. Our first-year report demonstrated this trend in the first year of the study.[1] Nonetheless, Alum Rock schools continued to offer a variety of options consisting of differentiated programs within and between schools.

The Alum Rock experiment showed that the mere infusion of funds is unlikely to result in major and lasting structural changes in a school system. However, it did encourage a good deal of experimentation with various alternative classroom approaches.

As a result of this experience, we came to see that the voucher demonstration was simply one of a larger class of alternative education programs that school districts are beginning to offer. We thereby expanded the study beyond Alum Rock to cover such districts as Eugene, Oregon, Minneapolis, Minnesota, and Cincinnati, Ohio, where other forms of student and parent choice systems are being tried out in the public schools.

The study has therefore progressively changed from an exclusive focus on vouchers in Alum Rock to a study of the implementation of alternatives in education, with Alum Rock as the primary analysis site. During the next year, we will be publishing a series of studies on alternatives, reflecting the points of view of the district, the principal, the teacher, and the family, as well as a case study of alternatives at the classroom level.

5. *Evaluation Design*

Rand not only conducts evaluations but also designs such studies in order to improve evaluation methodology in selected fields. A group of researchers, led by sociologist Robert Crain, conducted a one-year study for the U.S. Civil Rights Commission to design a national longitudinal evaluation of the effects of school desegregation in the United

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[1] D. Weiler, Study Director, *A Public School Voucher Demonstration: The First Year at Alum Rock*, R-1495-NIE, June 1974.

States. The Rand group described a series of studies that would allow the Government to obtain over a six-year period a wide variety of information on the effects of school desegregation. The study design was submitted to the U.S. Civil Rights Commission as a basis for allowing the Commission or other government agencies to issue contracts for collection of the required data.[1] In fact, the data collection phase never began because of political and funding problems.

Another design effort conducted for the Head Start office in HEW was completed under the supervision of educational researcher Senta Raizen, to develop methods of measuring social competence in Head Start children. Like the desegregation study, the design was never carried out in full by Head Start officials, although it too received substantial endorsement from the research community. The study specified a design for a national evaluation of Head Start, and recommended a preferred approach--that the agency undertake a system of small-scale systematic studies. The report proposed that local constituencies be allowed to define the outcomes of importance to them. The report also argued that the conditions under which Head Start had been implemented made it difficult to carry out any real experimental design with treatment and control groups.[2]

6. *How Compensatory Education Rejected Reform*

Educational sociologist Milbrey McLaughlin studied Title I of the Elementary and Secondary Education Act in order to see whether and how the Act's requirement for evaluation affected educational reform. On the whole, the study finds that the Title I policy system, at the federal, state, and local levels, has tended to be "impervious to information and to the intent of federal policies."

McLaughlin found that the federal government was not in charge of

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[1] R. Crain, D. J. Armor, F. Christen, N. King, M. W. McLaughlin, G. C. Sumner, M. Thomas, J. J. Vanecko, *Design for a National Longitudinal Study of School Desegregation*, R-1516/1-USCCR, R-1516/2-USCCR, September 1974.

[2] S. A. Raizen, S. B. Bobrow, T. K. Bikson, J. A. Butler, K. A. Heald, J. D. Ratteray, *Design for a National Evaluation of Social Competence in Head Start Children*, R-1557-HEW, November 1974.

Title I because Title I projects are determined by local school districts. This ultimately means that there are multiple goals which are unlikely to be consistent with many federal policies.

Not only were goals and methods diverse, but information on program operations was unsystematic. It therefore became very difficult to make any credible national evaluation of program effects. Some national evaluations of Title I cast doubt on the program's effectiveness, without pointing out any directions for program improvement. Nonetheless, USOE continues to collect Title I evaluation data, without any very clear policy goals.

The entire process raises basic questions about the merit of large-scale "rational" evaluations of education programs. In a federal system the gap between national aims and local practices may be unbridgeable. Local authorities may have no interest in collaborating with a "rational" national decisionmaking process. Nor are federal programs managers able to make policy choices that would be implemented at the local level according to federal desires.

The Title I experience indicates that a realistic and useful evaluation policy should acknowledge the constraints of the policy system and the behavior of bureaucracies.[1]

7. *Minority Children's Reading in Los Angeles*

In 1976, a Rand team led by economist Anthony Pascal conducted a six-month study for the Los Angeles Unified School District, aimed at describing and accounting for the reading gains of children in predominantly black and Mexican-American schools.

Rand and the district selected 20 schools where 80 percent or more of the students were from these minority groups, and where sixth-grade reading scores had appeared to improve over the previous three years.

The study, which collected test and background data for 2,000 students, surveyed teachers, and visited schools, found that after

[1] M. W. McLaughlin, *Evaluation and Reform: The Elementary and Secondary Education Act of 1965, Title I*, Ballinger Publishing Company, Cambridge, Massachusetts, 1975.

eliminating the effects of socioeconomic status, and of occasional excessive test preparation, differences in schools and classrooms did make a difference in the reading achievement of individual children. For Mexican-American children, none of the variables considered explained why those differences existed. For black children, the study found that certain specific practices contributed (differentially) to high reading scores:

-- High levels of parent-teacher contact
-- Teacher training in use of materials keyed to individual student needs
-- Teacher flexibility in modifying instructional approaches
-- Frequent informal consultation among teachers on reading methods
-- Enhancement of teacher morale to encourage feelings of effectiveness and confidence
-- Maintenance of an orderly classroom, free of disruption

The study concluded that the type of reading curriculum chosen was not significant in determining how well children would do on reading tests. The important factor was how any particular curriculum was carried out. The research also found that no single school or classroom factor would, of itself, be likely to produce large gains in reading; apparently many different factors must combine to produce steady gains.[1]

B. HOW DO EDUCATIONAL ORGANIZATIONS FUNCTION?

1. *Educational Research and Development Policy*

Three Rand staff members presented papers on educational innovation and on dissemination of educational research and development products at an NIE seminar in December 1972. A paper by economist John Pincus discusses the structure of the incentive systems of public schools as they relate to the adoption and implementation of innovations.

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[1] D. Armor, P. Conry-Oseguera, M. Cox, N. King, L. McDonnell, A. Pascal, E. Pauly, G. Zellman, *Analysis of the School Preferred Reading Program in Selected Los Angeles Minority Schools*, R-2007-LAUSD, August 1976.

The paper points out that the structure of the public school "industry" has a major effect on school decisions to adopt innovations. The bureaucratic structure and incentives of the schools shape the transition from adopting innovations to implementing them. The paper describes the implications of structure and bureaucratic behavior for the educational change process, and makes recommendations for future policy.

A second paper in this series by political scientist Dan Weiler discusses issues related to federal government programs for the dissemination of education R&D products, and suggests policy and research guidelines for the National Institute of Education. The paper: (1) describes a preferred NIE-sponsored research program; (2) proposes that parallel efforts be implemented to improve the existing system without making any long-term commitments; (3) argues that professionals in the system should participate in designing and carrying out long-run research and short-run improvements.

A third paper by educational researcher Senta Raizen examines the question of how to evaluate NIE's effectiveness. She suggests the following kinds of evaluations: (1) assess the technical quality of the R&D supported by NIE; (2) analyze the choice of questions or problems addressed by the research; (3) study the effectiveness of program output; and (4) observe the distribution of funds and other benefits.[1]

2. *The Value of Teachers in Teaching*

Another study, sponsored jointly by the Carnegie Corporation and Rand, was conducted by Eric Hanushek, an economist. This study is the first so-called production-function study (relating resource use to student outcomes) to focus on the interaction between teachers and individual student outcomes, rather than average class or school outcomes. Using data collected from about one thousand third-graders in

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[1] J. Pincus, *Incentives for Innovation in the Public Schools*, P-4946, January 1973; D. Weiler, *The Dissemination of Educational R&D Products: Research and Policy Issues for the Federal Government*, P-4984, March 1973; S. A. Raizen, *Evaluating the National Institute of Education*, P-4942, February 1973.

one school district, Hanushek related test scores to pupils' backgrounds, classmates, prior progress, and characteristics of first-, second-, and third-grade teachers. He found that some teachers helped to produce significantly better reading scores than others. Specifically, teachers with high verbal scores, formal training, and aversion to spending time on discipline were more likely to be successful with Anglo children. No such results were found for Mexican-American children, but none of the teachers were Spanish-speaking. Factors such as amount of education and length of service, which are the basis of teacher salary schedules, played no part in reading gain difference.[1]

3. *A Search for Effective Schools*

Two economists, Robert Klitgaard and George Hall, again in a study sponsored by Rand and the Carnegie Corporation, analyzed achievement test scores by school and grade for large numbers of schools in Michigan and New York, as well as from a national sample. Their aim was to find out whether there were schools that consistently produced outstanding students even after allowing for differences in students' initial abilities. Using multiple regression methods, they detected "outlier" schools, which consistently outperformed expectations to an extent that could not be due to chance. These schools tended to have smaller class sizes, higher teacher earnings, and more experienced teachers than the average school. Unfortunately, the scope of the project did not allow Hall and Klitgaard to visit the high-performing schools or collect new data from them, so they could not test hypotheses about the factors that may have accounted for high performance.[2]

Under National Institute of Education sponsorship, Klitgaard subsequently discussed how achievement scores might be used more effectively to evaluate public schools. He suggested that there be more focus on individuals rather than on group averages, and the use of a wider variety of measures of frequency distributions than is now generally

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[1] E. Hanushek, *The Value of Teachers in Teaching*, RM-6362-CC/RC, December 1970.

[2] R. E. Klitgaard and G. R. Hall, *A Statistical Search for Unusually Effective Schools*, R-1210-CC/RC, March 1973.

used. Such measures, he argued, could be applied to educational accountability systems.[1]

4. *The Success and Failure of Innovative Projects*

From July 1973 to December 1976, Rand conducted a study, sponsored by the U.S. Office of education, that investigated federally funded innovative projects (selected from those funded by Title III of the Elementary and Secondary Education Act; Title VII of ESEA; Vocational Education Act, Part D; and Right-to-Read). The chief aims of the large-scale study, directed by political scientist Paul Berman and educational sociologist Milbrey McLaughlin, were first, to find out what accounted for project success or failure, and second, what accounted for projects being discontinued or continued when temporary federal funding ceased.

These questions divided the study into two phases, exploring project success and project continuation, respectively. The Phase I studies, five volumes issued in April 1975, were based on questionnaires administered to teachers and school officials describing 293 projects in some 200 districts, as well as on field case studies covering 30 projects chosen from the sample of 293. Analysis of data and the results of the case studies indicated that successful projects, as described by participants and their supervisors, tended to have the following characteristics:

1. A receptive institutional setting, one where the organizational climate and the motivation of participants are favorable to the change.

2. An implementation strategy that allows the project to adapt to the realities of the school setting, and also allows the staff and organization of the schools to adapt to the project.

3. A scope of change that is large enough to make it difficult to revert to old ways of doing things.

The study also found that differences in project resources and differences in federal management strategy had no significant effect on project outcomes. In other words, the way each project was actually

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[1] R. E. Klitgaard, *Achievement Scores and Educational Objectives*, R-1217-NIE, January 1974.

carried out dominated the results, given a receptive institutional setting.

Phase II of the study, reported in three volumes, investigates what happened to the projects two years later, when federal funding was often no longer available. One volume deals with Title VII of ESEA (bilingual). It points out that such projects are likely to be continued whether or not they are successful, because bilingualism is a political movement as well as an educational one. Second, Title VII projects are not usually innovative, and tend to be parochial, ignoring the existence of suitable commercial curricula, and are often plagued by shortages of trained staff, materials, and models.

The final two volumes of the study, scheduled for publication in 1977, will respectively analyze the data collected during Phase II, and discuss the results of both Phase I and Phase II.[1]

5. *School Districts and the Process of Change*

Another organizational study, supported from July 1974 to December 1976 by a grant from the National Institute of Education, looks at the school district, not the individual project, as the nexus of the change process. The study, under the direction of educational sociologist Milbrey McLaughlin, focuses on the way school districts adapt to or shape educational change. The researchers spent time in five urban school districts, interviewing school staff, political figures, and people in community organizations, and visiting selected individual schools. The researchers developed a theory of school districts as maintenance organizations, ones that continuously adapt to changing reality by trying to minimize external influences on established ways of doing business. Such organizations tend to respond to external pressures in ways that allow the organization to keep functioning with a minimum of disruption. This tendency can be routinized, leading to the phenomenon of "movement without change," and often a certain long-run stagnation. Some districts avoid this by following a "developmental"

[1] P. Berman, M. W. McLaughlin, E. Pauly, P. W. Greenwood, D. Mann, J. Pincus, G. Sumner, G. Zellman, *Federal Programs Supporting Educational Change*, Vols. I-VIII, R-1589/1-8, April 1975-February 1977.

policy, one which turns environmental pressures into instruments of long-run change in the organization and its functioning. In such cases, the change process may itself become routinized. But a developmental process or even the characteristic routinized maintenance process may "decay," leading to a decline in the organization and the quality of service it delivers.

This theory implies that outside funding for innovation should be targeted on districts that are willing and able to follow certain organizational policies. On the other hand, it may also imply the need for state or federal funding specifically aimed at changing organizational behavior, by such devices as management training, teacher training in new methods, or even tying federal funding to progressive changes in management. The study has not yet published a formal report.

C. SCHOOL FINANCE: PROBLEMS AND REMEDIES

1. *Program Budgeting and the Schools*

USOE financed Rand in 1969 to conduct a series of seminars for California school administrators on the subject of program budgeting in education. This subject, then popular in federal government and school finance circles, was one of Rand's early forays into the field of public education, drawing on Rand's program budgeting experience in national defense. This work, under the supervision of cost analyst Sue Haggart, continued at Rand for several years, with various applications. The general approach is described in a Rand book published in 1972.[1] It presents program budgeting as a resource allocation system that stresses setting objectives, grouping activities into programs to meet the objectives, identifying the resources required by the programs, and measuring how effectively the programs meet the objectives. This system requires a change from traditional accounting systems, and the book, illustrating how these changes can be made, shows how the new system can be used to conduct resource analyses, develop cost models, assure program effectiveness, and evaluate alternatives.

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[1] S. A. Haggart, S. M. Barro, M. B. Carpenter, J. A. DeiRossi, M. L. Rapp, G. C. Sumner, *Program Budgeting for School District Planning*, Educational Technology Publications, Englewood Cliffs, N.J., 1972.

Along the same lines, Sue Haggart and others have cooperated with the Association of School Business Officials in preparing a book on program budgeting and resource use (1971) and in developing for the California State Department of Education a cost model for California schools (1971).

2. *Theoretical Studies in School Finance*

During the period 1970-72, Stephen Barro and other economists conducted several theoretical studies of school finance under Ford Foundation sponsorship. One study by E. O. Olsen developed an econometric model for predicting how outside aid would affect school districts' own expenditure plans. The study also attempted to estimate the preference functions underlying school district behavior, thereby making it possible to predict impacts of all types of aid, even those that have not been used in the past.[1]

Another study in this series, by Barro, developed theoretical models based on the concept that decisionmakers seek an optimum balance between education program levels and tax burdens imposed on the community. The models take into account community income, grants received, costs of educational inputs, the pupil/household ratio, and the local share of matching grants. Elaborations of the model include the effect of other taxes, composition of the property tax base, equalizing elements of state aid, and other factors. In principle, the models provide guidance for selecting preferred aid formulas in light of a grantor's objectives.[2]

3. *School Finance Issues in California*

Economist Stephen Barro, with support from Rand and the Carnegie Corporation, analyzed the California school finance system in 1970-1971. He found that there were major disparities in spending and taxing among California school districts which were not related to districts'

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[1] E. O. Olsen, *A Method for Predicting the Effects of Different Forms of Outside Aid on Local Educational Expenditure*, R-807-FF, December 1972.

[2] S. M. Barro, *Theoretical Models of School District Expenditure Determination and the Impact of Grants-in-Aid*, R-867-FF, February 1972.

willingness to support education. The state system relied primarily on the local property tax, whose yield varied widely among districts; furthermore, the system took little account of differences in student needs. Barro suggested certain reform alternatives such as a statewide property tax, full state funding of education, or a variable matching system which would provide equal funding per student for equal tax effort.[1]

California's school finance system was subsequently changed in 1973 to provide for a higher level of state support and some reduction in inter-district inequalities in spending. This was the state's initial response to the prospect that the courts would rule the existing school finance system unconstitutional because it depended on the wealth of one's neighbors and not on that of the state as a whole.

In light of that prospect, Rand was commissioned in 1972 by the Ford Foundation to conduct some research on California school finance and the implications of the 1971 *Serrano v. Priest* decision, in which the California Supreme Court had upheld in principle the merits of statewide equality in school finance (in 1976 a final decision confirmed the Supreme Court's original decision).

One study, edited by economist John Pincus, was a series of essays in book form on the economic, political, educational, and social issues of *Serrano v. Priest* and similar cases.[2] The essays point out that reforms aimed at equalizing school spending per dollar of tax rate tend to benefit mostly property taxpayers in low-wealth districts and to cost most to those in high-wealth districts. The effects on educational outcomes are unclear; in some states, like California, equalizing per-pupil spending would not on the whole benefit poor children, because many of them live in high-wealth districts. In general, the educational effects of equalizing school finance are unpredictable. The volume discusses specific problems of financing and administering education under different proposed arrangements.

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[1] S. M. Barro, *Alternatives in California School Finance*, R-663-RC/CC, May 1971.

[2] J. Pincus, ed., *School Finance in Transition: The Courts and Educational Reform*, Ballinger Publishing Company, Cambridge, Massachusetts, 1974.

A second study for the Ford Foundation, by economist Arthur Alexander, describes and analyzes inequalities in California school finance.[1] Alexander found that most groups in California, whether classified by race, income, ethnic group, or urban status, are spread quite evenly across high- and low-spending school districts. This means, among other things, that poor people as a whole might not benefit from school finance equalization. It has often been argued that there would be substantial equalization to be derived from splitting the tax rolls to allow school districts to tax only residential property, while the state taxed industrial property and redistributed the proceeds. Alexander's analysis indicates that in California this step might have some effects on extremes of property wealth, but little overall effect on inequality. The report discusses other possible remedies, and finds that equalization might be achieved by a combination of state aid, required minimum tax rates and so-called "power equalizing" which allows each district to raise funds as if it shared the statewide average per-pupil tax base.

Alexander and urban planner Gail Bass analyzed 1600 California school district property tax elections from the mid-1950s to 1972, and found few differences in the social, economic, and financial characteristics of districts where elections were won or lost.[2] Normally, small tax increases were more likely to pass than large ones, and districts with relatively more high-income families were more likely to support tax increases. There was evidence of a sharp reduction in voters' willingness to approve tax increases, starting in the early 1960s. There was a tendency among school districts to avoid calling new tax elections when property values rose sharply, and to call them when tax rates were unpredictably low.

The final report in this Ford Foundation-sponsored series, also by Alexander, looks at how additional funds that school finance reform

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[1] A. J. Alexander, *Inequality in California School Finance: Dimensions, Sources, Remedies*, R-1440-FF, March 1975.

[2] A. J. Alexander and G. V. Bass, *Schools, Taxes, and Voter Behavior: An Analysis of School District Property Tax Elections*, R-1465-FF, April 1974.

could generate might be spent.[1] Analyzing data on 602 California school districts for 1971-72, Alexander found that as revenues increased, spending on teachers did not rise as fast as total spending. In particular, salary schedules rose relatively little, and much of the increase was devoted instead to higher teacher-pupil ratios, and to employing higher proportions of experienced teachers and those with advanced degrees. This evidence tends to contradict the view that higher school district revenues are often largely channeled to higher staff salaries.

4. *School District Spending Patterns, Revisited*

Under National Institute of Education sponsorship, economists Stephen Barro and Stephen Carroll examined the question of how school districts spend additional money.[2] Instead of using the California data analyzed by Alexander, these researchers studied 195 Michigan school districts for the years 1968-1970. They found: (1) that per pupil spending for teachers goes up three-fourths of one percent for each one percent budget increase (like Alexander, they found that most of this increase went to reducing class sizes); (2) that per-pupil spending on supplies, equipment, and specialist teachers rose faster than the rate of budget increase. Districts with higher-income residents tended to spend more per pupil than low-income districts on teachers and administrators, and less on supplies, equipment, and specialists.

5. *Center for School Finance and Organization*

In December 1975, the Office of the Assistant Secretary for Education in HEW awarded Rand a three-year contract to establish a policy research center in the field of school finance and organization. This center advises HEW on present and future policy issues that the government may face in these fields. Under the direction of historian Michael Timpane and economist Stephen Barro, a number of projects

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[1] A. J. Alexander, *Teachers, Salaries, and School District Expenditures*, R-1588-FF, October 1974.

[2] S. M. Barro and S. J. Carroll, *Budget Allocation by School Districts: An Analysis of Spending for Teachers and Other Resources*, R-1797-NIE, December 1975.

are underway or completed. Completed projects include a survey of the educational accountability movement at the state level, by political scientist Michael Kirst and urban planner Gail Bass; a description by political scientist Lorraine McDonnell of the pattern and effects to date of public employees' collective bargaining arrangements, particularly those of teachers, with a discussion of the implications for governance; and a symposium, organized by Timpane, on issues in school finance and organization, with emphasis on implications for federal policy. Symposium papers will be published in 1977.

Other studies under way or planned include: (1) analysis of macroeconomic and demographic contexts for school finance; (2) investigation of urban school finance capabilities, notably the issue of municipal overburden; (3) developments in the financing of special education; (4) analyzing the merits of consolidating federal education grants to states and localities; (5) further analysis of the effects of collective bargaining on school district behavior; (6) estimating the effects of federal aid on state school finance reforms.

The work of the policy research center is relatively new, and its major studies on school finance and organization are just getting under way. It is expected that during the three-year term of the center's initial contract with HEW the center will increasingly become a focus for much Rand work on educational finance and organization. Frequently the results of studies financed from other sources offer potential policy implications for HEW that can be refined and extended through the work of the policy center.

6. *The Effects of State School Finance Reform*

As a result of *Serrano* and other decisions, a number of states have reformed their school finance systems. With NIE sponsorship, economists Stephen Barro and Stephen Carroll are conducting a study of five states (California, Florida, Kansas, Mighigan, New Mexico) to find out how well their reforms are working in terms of the major criteria--greater equality in spending and taxes, and a redistribution of taxes and spending that favors less wealthy districts. The study will also analyze how districts respond to the new state finance

systems and, finally, will compare how reforms work out in different kinds of statewide environments.

This work is intended to lead to conclusions about the effects of these reforms and recommendations about kinds of reform measures that appear most likely to be effective in equalizing school spending within a state. By comparing pre-reform and post-reform fiscal patterns (and projecting pre-reform patterns to the present), it is possible to compare roughly the equalizing effects of old and new school finance systems in each of the five states. Using econometric methods, this analysis will be refined, focusing on school districts' response behavior to incentives or disincentives offered by the state school finance plans, and will lead to policy recommendations on school finance reform.

D. SCHOOLING, DESEGREGATION, AND DISCRIMINATION

1. *Does Federal Aid Lead to Better Learning in Desegregated Schools?*

In 1969-1970, the federal government started providing special funds under an Emergency School Assistance Program (ESAP) to schools that were desegregating, in order to the make the process more successful. In 1971-1972, USOE arranged for an evaluation of program effects. The contractor, National Opinion Research Center (NORC), collected data in several hundred school districts and, using matched pairs of schools, found that tenth grade black male students in ESAP-funded schools had higher achievement test scores than those in control schools. The senior author of the NORC report, sociologist Robert Crain, now a Rand staff member, argued that the NORC study showed a clear contrary signal to the familiar view that compensatory education has failed.

The U.S. Office of Education then asked Rand to reanalyze the NORC data, focusing on noncognitive elements. Sociologist Henry Acland conducted the analysis and came to somewhat different conclusions from the NORC study, although his results did not reject the tenth grade achievement finding.[1] He did find, contrary to NORC, that the data did

[1] H. Acland, *Secondary Analysis of the Emergency School Assistance Program*, R-1868-HEW, December 1975.

not show superior racial climate in ESAP-funded schools, nor any systematic effect of various psychological variables on educational achievement. Successful ESAP schools tended to be small and located in rural areas, but it was usually hard to define what the ESAP program was in any school and how the program differed from that of control schools.

2. *Federal Funds for Technical Aid to Desegregation*

Under U.S. Office of Education sponsorship, a Rand study led by Stephen Crocker, a political scientist, evaluated the operations funded by Title IV of the Civil Rights Act of 1964. These funds are devoted to technical assistance and training for schools in various stages of desegregation. The aid takes four forms: direct funding of districts, support of technical assistance activities of state education agencies (SEAs), funding of training institutes (TIs) that offer desegregation-related training for school districts, and support of general assistance centers (GACs), often university-based that offer technical assistance and training.

The study, based on mail questionnaires and field visits, found that the program was targeted both at central administrators and at teachers and principals. This policy of multiple targeting implied that USOE endorsed no single theory of how to bring about change in school districts. GACs provided a wide range of services to school districts. Crocker and his associates found that GACs were most likely to bring about change at the school district level because they often developed good access to school district officials and knew well the communities they served.

SEAs tended to provide technical assistance in a top-down manner, and often reported difficulties in implementation. There was little support for desegregation on an SEA-wide basis.

Training institutes worked with teachers a good deal and tried to respond to specific district needs. Directly funded local education agencies tended to be successful according to the degree of desegregation commitment shown by the superintendent and his top staff.

The problems of Title IV stem largely from the fact that there is much public and Congressional opposition to a federal role in school

desegregation. Therefore, the program as it operates cannot be, or even appear to be, coercive. As a result, it tends to focus on procedures for distributing funds rather than on desegregation effects. The Rand study makes recommendations aimed at encouraging Title IV to focus more on desegregation activities in situations where some progress is likely.[1]

3. *Sex Discrimination in the Educational System*

In January 1976, after Rand completed its work on federal technical assistance for school desegregation under Title IV of the Civil Rights Act, the U.S. Office of Education asked us to extend the scope of the work. Title IV guidelines had recently been revised to include sex-discrimination assistance. Rand's current study, scheduled to end early in 1977, examines how the Title IV program has been changed by the introduction of sex discrimination assistance.

The project directors, policy analyst Peggie Thomas and urban planner Nicki King, have collected data from Title IV project officers and school districts to find out what they are doing in the fields of race and sex discrimination, what the problems and the results have been, and how effective the projects think they are in helping districts reduce sex and race discrimination. The study will also focus on factors that promote or retard project effectiveness, and will try to determine the effect of adding sex discrimination responsibilities to the existing Title IV structure.

4. *Mobilizing Community Resources for Desegregation*

Rand is now working on another project in the field of technical assistance for desegregation. The federal Emergency School Assistance Act (1972) provides money for desegregation to school districts. Some of these funds go to nonprofit community organizations to promote more effective school desegregation. A Rand research group, led by political scientist Stephen Crocker, is studying these nonprofit organizations (NPOs),

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[1] S. Crocker, R. Crain, M. H. Graubard, J. M. Kimbrough, N. J. King, M. A. Thomas, F. M. Wirt, with the assistance of L. P. Oliver, *Title IV of the Civil Rights Act of 1964: A Review of Program Operations*, R-1901-HEW, September 1976.

under U.S. Office of Education sponsorship. This national study seeks to describe what the NPOs are doing and assess their effectiveness. More specifically, the researchers are collecting data on:

-- The grants award process--notably how USOE regional offices select districts and NPOs for award, and the collaboration and conflict between districts and NPOs.

-- The federal, regional, and local characteristics that affect organizational effectiveness in this program.

-- How funded NPOs differ from those that are not funded.

With the data they collect, the researchers will assess such policy questions as how to make sure that the most effective NPOs are in the ESAA network, how to make most useful the school districts' and regional offices' roles in the NPO application process, and the merits of annual vs. long-term funding for NPOs.

This work will be completed in the fall of 1977.

5. *What Has Desegregation Policy Been?*

In October 1976, the Department of Health, Education, and Welfare commissioned Rand to study what federal and state school desegregation policy has been since 1954. The study, directed by an economist, Millicent Cox, will investigate the following questions: (1) Has federal desegregation policy been different in North and South? (2) Has it affected relatively few minority students? (3) Have variations in federal and state mandated plans led to differences in the treatment of similar districts? (4) Has the desegregation process neglected non-black minorities?

The research will be based on the creation of a large-scale data file on court orders, desegregation plans, and administrative orders affecting desegregation. The data will also be used to investigate policy questions on the role of community collaboration in planning and implementing desegregation, the determinants of how smoothly desegregation was carried out, and the criteria used by the courts in issuing orders or approving desegregation plans.

E. OTHER STUDIES

In addition to the studies of evaluation, finance, desegregation, and organizational behavior, Rand has conducted educational research

in several other fields: higher education, education for the handicapped, educational technology, and educational management and research policies. In recent years, Rand has done little work in the latter two fields, but studies of higher education and problems of the handicapped continue.

1. *Higher Education*

In this field, Rand has concentrated on estimating how federal and state aid to higher education affects students' decisions about whether to go to college, and which college to attend. In an early study, sponsored by the National Science Foundation and supervised by political scientist David Mundel, a mathematical model was developed to explain student choice as a function of successive decisions about whether or not to commute to school, about the "best" college available in light of the first decision, and about whether to choose the "best" college available or none.[1]

Another study in the same NSF-sponsored project, by economist Stephen Carroll and statistician Daniel Relles, applies a statistical model to analyze the college-going behavior of Florida high school seniors.[2] The study was designed to allow higher education decision-makers in that state to predict enrollments, and was also designed for annual updating on the basis of data regularly available in the state.

However, the methods used to make these projections are very expensive in terms of computer use time. Carroll and Relles, under grants from the National Institute of Education and the Lilly Endowment, tried another approach, using a statistical approach known as Bayes' theorem.[3] This method, when applied to a national survey sample of high school seniors, produced better estimates of actual college-going behavior than other models, at a substantially lower cost.

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[1] M. G. Kohn, C. F. Manski, and D. S. Mundel, *An Empirical Investigation of Factors Which Influence College-Going Behavior*, R-1470-NSF, September 1974.

[2] S. J. Carroll and D. A. Relles, *The Transition from High School to College: A Study of Freshman Enrollments in Florida*, R-1735-NSF, August 1975.

[3] S. J. Carroll and D. A. Relles, *A Bayesian Model of Choice Among Higher Education Institutions*, R-2005-NIE/LE, June 1976.

This research is continuing under Carroll's direction, with support from both the Lilly Endowment, which is funding a study of college freshmen's enrollment decisions in Indiana, and the Department of Health, Education, and Welfare, which is funding an enrollment prediction model using a national data base collected over several years from people who were in the twelfth grade in 1972.

2. *Education of the Handicapped*

For several years, mathematician Samual Genensky and a group of collaborators have been working, under the sponsorship of HEW, to improve the vision of the partially sighted, notably in the classroom setting. They have developed a magnified interactive closed-circuit TV system, with a number of operating cameras, that allows the teacher and students to be in constant visual communication. The system, as tried out in two California schools, has proven successful, allowing visually handicapped children to experience much more visual communication than was previously possible. This work is continuing in the schools, and is part of a broader program of developing aids for the partially sighted.[1]

Policy analyst James Kakalik and political scientist Garry Brewer led a broad study for HEW which examined current services offered to handicapped children, particularly those whose hearing or vision is impaired.[2] The federal government offers more than 50 major programs for the handicapped, and state and local agencies offer hundreds more. The researchers found that the programs, which cost $5 billion a year,

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[1] S. M. Genensky, *Binoculars: A Long-Ignored Aid for the Partially Sighted*, R-1402-HEW, November 1973; S. M. Genensky, H. E. Petersen, R. I. Yoshimura, J. B. von der Lieth, R. W. Clewett, H. L. Moshin, *Interactive Classroom TV System for the Handicapped*, R-1537-HEW, June 1974; S. M. Genensky, H. E. Petersen, R. W. Clewett, and H. L. Moshin, *A Double X-Y Platform for RANDSIGHT-Type Instruments*, R-1614-HEW, December 1974; S. M. Genensky, H. E. Petersen, R. W. Clewett, and H. L. Moshin, *Information Transfer Problems of the Partially Sighted: Recent Results and Project Summary*, R-1770-HEW, June 1975.

[2] J. S. Kakalik, G. D. Brewer, L. A. Dougharty, P. D. Fleischauer, S. M. Genensky, I. M. Wallen, *Improving Services to Handicapped Children*, R-1420-HEW, May 1974.

are mostly worthwhile, but the system as a whole falls below its potential. System improvement should begin with basic service needs such as prevention of handicapping conditions, identification of handicapped youth, directing people to service providers, medical treatment, corrective aids, special education, counseling, vocational training, job placement, and financial assistance, and should include support for research and development.

The report develops several models of government roles for providing services, and presents an array of recommendations keyed to various possible levels of government spending.

Kakalik and Brewer also studied the special problems of mental health and mental retardation for the State of Nevada, under sponsorship of the Max C. Fleischmann Foundation.[1] About 66,000 people a year in Nevada need services for mental disorders, mental retardation, and drug or alcohol abuse, at a cost to the public of $35 million. The Rand report makes recommendations for improving these services. The recommendations vary, depending on the level of state or local spending that would be contemplated. Major improvements would be possible with only slight increases in spending.

3. *Educational Technology, Management and Research Policy*

a. Technology. Rand joined during the 1960s in the somewhat uncritical reception of educational technology as a potential Aladdin's lamp for educational achievement. With the publication of such studies as *A Taxonomy of Communications Media, The Emerging Technology, Cable Television and Higher Education, Telecommunications in Urban Development,* and *Applications of Advanced Technology to Undergraduate Medical Education*, Rand investigated a number of issues in educational technology, notably the uses of television and computers.[2] On the whole, it has

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[1] J. S. Kakalik, G. D. Brewer, L. L. Prusoff, D. J. Armor, P. A. Morrison, *Mental Health and Mental Retardation Services in Nevada*, R-1800-FLF, April 1976.

[2] R. Bretz, *A Taxonomy of Communication Media*, Educational Technology Publishers, Englewood Cliffs, N.J., 1970; R. E. Levien, S. M. Barro, F. W. Blackwell, G. A. Comstock, M. L. Hawkins, K. J. Hoffmayer, W. B. Holland, C. Mosmann, *The Emerging Technology: Instructional Uses of the*

turned out that many educational institutions resist, for financial or organizational reasons, the introduction of radically new technologies, particularly those that threaten familiar approaches to pedagogy and to relationships within the system. Nonetheless, the passage of time tends to wear down some of the opposition, and to the extent that new methods represent a clear advance, they are likely to win wider acceptance.

b. Management Methods and Research Policy. One early Rand study aimed at assisting educational management was the design of a comprehensive information system for educational management, supported by Los Angeles City Schools. The system was designed to support educational accountability to help hold schools and educators responsible for educational results.[1] On this basis, data requirements for management were built up, although one of the Rand studies warned that the state of knowledge about teaching and learning was too slight to allow precise definition of accountability, or even precise measurement of outcomes. After receiving the Rand report, Los Angeles City Schools decided not to adopt the proposed system.

Another Rand management study, conducted by Peter Greenwood, a management scientist, and Dan Weiler, a political scientist, investigated the federally funded network of clearinghouses for the Educational Resources Information Center.[2] This activity, funded by the U.S. Office of Education, is a bibliographical and abstracting service for journal articles and so-called fugitive literature (reports, government publications, research studies, texts of speeches) in the field of education.

Computer in Higher Education McGraw-Hill Book Company, New York, 1972; L. L. Johnson, *Cable Television and Higher Education: Two Contrasting Experiences*, R-828-MF, September 1971; H. S. Dordick, L. G. Chesler, S. I. Firstman, R. Bretz, *Telecommunications in Urban Development*, RM-6069-RC, July 1969; J. A. Farquhar, R. Bretz, A. S. Ginsberg, T. I. Lincoln, R. J. Melone, G. F. Mills, *Applications of Advanced Technology to Undergraduate Medical Education*, RM-6180-NLM, April 1970.

[1] J. Farquhar, *An Information System for Educational Management: Executive Summary*, R-989-LACS, March 1972. Other volumes were published as R-930-LACS, R-931-LACS, R-932-LACS, R-933-LACS, R-934-LACS, R-935-LACS, all dated December 1971.

[2] P. W. Greenwood and D. Weiler, *Alternative Models for the ERIC Clearinghouse Network*, R-951-HEW, January 1972.

Greenwood and Weiler defined a range of possible objectives for the information system, and described alternative organizational structures for meeting these objectives. After the study was done, the U.S. Office of Education made some changes in the ERIC system which were less comprehensive than those recommended by the Rand researchers.

In the international field Rand was called upon by UNESCO to assist the Indonesian Ministry of Education in improving the planning process for their education system. Economists Fred Hoffman and Larry Dougharty advised the Ministry during 1971-1972 on ways of approaching the main issues that Indonesia then faced in that field.

In the research policy field, Rand played a large part in structuring the National Institute of Education. In 1970, computer scientist Roger Levien headed a group of researchers who developed a plan for the functions and organization of the proposed National Institute of Education, a federal educational research institution. The Administration and Congress relied heavily on the Rand study in developing the legislation that established the new agency in 1972.[1]

Levien and colleagues then were commissioned by the Carnegie Corporation in 1972 to work out a research and development agenda for American education. They approached the problem by categorizing various possible R&D approaches in terms of costs, possibilities of payoffs, and returns associated with those payoffs. Their work, as yet unpublished, was the first systematic effort to determine under specified assumptions the relative costs and benefits of different types of research and development priorities.

A different type of management study emerged from a series of Rand seminars for educational administrators directed by James Bruno, a management scientist, during 1970 and 1971. He attempted to help educational managers look at such questions as: What is happening in education today? What will happen in the future, and what are the implications for school district policy? The seminars, and a volume based on them, were aimed at helping school personnel understand the policy implications of current educational research.[2]

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[1] R. E. Levien, *National Institute of Education: Preliminary Plan for the Proposed Institute*, R-657-HEW, February 1971.

[2] J. A. Bruno, ed., *Emerging Issues in Education: Policy Implications for the Schools*, D. C. Heath and Co., New York, 1972.

III. HUMAN RESOURCES RESEARCH

III.1. RECENT RESEARCH

In recent years, human resources studies at Rand have focused on three topics: the links between education and work, analysis of the educational personnel system, and research on welfare programs.

A. *EDUCATION AND WORK*

1. *Mid-Life Career Redirection*

For the National Science Foundation, Anthony Pascal, an economist, led a team of social scientists in a study of programs facilitating mid-life redirection of careers. It surveys and evaluates the literature on domestic and foreign programs for career redirection and adult retraining sponsored by government, employers, and unions, to inform policymakers on promising features for program design and to identify additional research requirements. Although some facilities now exist to aid would-be career-changers aged 30 to 55, they are poorly integrated and do not appear to lead to very rewarding jobs. Furthermore, valid scientific evaluations of those programs are rare. The report therefore recommends conducting pilot programs to gather sound data on the target group served, program costs, and program consequences, and calls for more information on the pervasiveness and effects of employer discrimination against the older worker.[1]

2. *The Behaviour of High School Graduates*

The Office of Education commissioned Stephen Carroll, an economist, and Peter Morrison, a demographer, to develop a research and analysis agenda to utilize a newly available data base on the postsecondary behavior of a cohort of high school students.

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[1] A. H. Pascal, D. Bell, L. A. Dougharty, W. L. Dunn, V. M. Thompson, L. S. Olsen, L. L. Prusoff, *An Evaluation of Policy Related Research on Programs for Mid-Life Career Redirection* (Vol. I, *Executive Summary*, and Vol. II, *Major Findings*), R-1582-1/2-NSF, February 1975.

Federal decisionmakers confront a variety of policy issues that hinge on students' postsecondary behavior. Until now, the limitations of data on students' postsecondary decisions (to continue their education, to marry, to enter the labor force, and so on), the factors that influence their decisions, and the consequences, for them and for the nation, of their decisions have hindered research on these issues. The National Longitudinal Study (NLS) promises to overcome many of these limitations. The NLS, sponsored by the U.S. Office of Education, began in Spring 1972 with the first examination of a national probability sample of about 22,000 high school seniors in approximately 1200 schools. These students were reinterviewed in October 1973 and October 1974. Further follow-ups in subsequent years are planned. The report presenting our research/analysis agenda has four main objectives: (1) to identify the ways in which the data developed by the NLS can be brought to bear upon the policy issues that confront federal decisionmakers; (2) to foster the efficient and orderly use of a large and expanding longitudinal data base by a wide range of researchers with different substantive interests; (3) to time certain key studies to be completed in advance of foreseeable national problems; and (4) to identify potential complementarities between NLS and other large data sets.[1]

3. *Public Policies Toward Youth*

Michael Timpane, an historian, Susan Abromowitz, an educator, Sue Berryman Bobrow, a sociologist, and Anthony Pascal, an economist, participated in a critical review of task force and panel reports on youth and adolescent education. This study was sponsored by the Office of the Assistant Secretary for Planning and Evaluation, HEW.

Three recent reports on adolescent youth, *Youth: Transition to Adulthood*, by the President's Science Advisory Committee, *The Reform of Secondary Education*, commissioned by the Kettering Foundation, and *Report of the National Panel on High School and Adolescent Education*, prepared by the National Panel on High School and Adolescent Education, represent a collection of assumptions, evidence, and policy recommendations

[1] S. J. Carroll, P. A. Morrison, *National Longitudinal Study of High School Seniors: An Agenda for Policy Research*, R-1964-HEW, July 1976.

directed toward decisionmakers responsible for federal policy on adolescent education. Looked at together, the three studies offer a continuum of conventional contemporary viewpoints about the performance of secondary schools. Each report reacts to the same stated problems of student and community dissatisfaction with educational performance, the intrusion of social unrest into educational settings, and disturbing new patterns of values amd behavior among youth. There is a substantial degree of overlap in their recommendations, e.g., more contact between youth and adults, particularly in work-related settings, more alternative educational paths, reform in school governance and curriculum. The review evaluated the assumptions and conclusions of the reports in the light of available evidence about the socialization of youth, the relationship of education and labor markets, and reform of the high school. Policy implications of the resulting synthesis are spelled out. The Rand study expresses doubt about the evidence and logic of the reports, but supports further exploration of their recommendations, notably individualized education, performance criteria, staff development, and provision of educational drawing rights for youth.[1]

4. *Education and Technological Change*

A team of Rand researchers led by Duran Bell, an economist, performed a study for the National Science Foundation on the effectiveness of education in helping people cope with technological change.

Scientific professionals, managers, blue-collar workers, women, and older workers all have problems of skill obsolescence due to technological change. The authors reviewed the available literature on the effectiveness of the educational system in preparing these groups of people for technological change that affects the requirements of their jobs or consumer roles. The study reported on the extent to which pre-adult and adult programs effectively deal with issues related to technological change, and the access of people with different needs

[1] M. P. Timpane, S. Abramowitz, S. B. Bobrow, A. H. Pascal, *Youth Policy in Transition*, R-2006-HEW, August 1976.

to the relevant education. It emphasizes the absence of national assessments of needs or of systematic program evaluation.[1]

B. *ANALYSIS OF EDUCATIONAL PERSONNEL SYSTEMS*

For the U.S. Office of Education, a Rand team headed by Stephen Carroll, an economist, conducted an extensive analysis of the educational personnel system serving elementary and secondary schools. Topics examined in the course of the research include: the mobility of teachers within and between school districts, teacher termination, the supply of and demand for teachers, and school staffing. The results of the analysis are brought together in a comprehensive examination of the market for elementary and secondary teachers. The study concludes that, contrary to popular belief, the teacher surplus will not continue to worsen into the 1980s. Rather, the surplus is likely to peak in the mid-1970s and then decline through the early 1980s. Moreover, there is a real possibility that a shortage of teachers will emerge in the mid-1980s.[2-9]

Under the auspices of Rand's Center for Educational Finance and

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[1] D. Bell, T. K. Bikson, P. J. Rich, J. M. Wuchitech, *The Role of Education in Facilitating Adaptation to Technological Change: An Analytical Framework and Review of the Literature*, R-1821-NSF, June 1976.

[2] D. H. Greenberg, J. J. McCall, *Analysis of the Educational Personnel System: I. Teacher Mobility in San Diego*, R-1071-HEW, January 1973.

[3] D. H. Greenberg, J. J. McCall, *Analysis of the Educational Personnel System: II. A Theory of Labor Mobility with Applications to the Teacher Market*, R-1270-HEW, August 1973.

[4] S. J. Carroll, *Analysis of the Educational Personnel System: III. The Demand for Educational Professionals*, R-1308-HEW, October 1973.

[5] E. B. Keeler, *Analysis of the Educational Personnel System: IV. Teacher Turnover*, R-1325-HEW, October 1973.

[6] S. J. Carroll, K. F. Ryder, Jr., *Analysis of the Educational Personnel System: V. The Supply of Elementary and Secondary Teachers*, R-1341-HEW, February 1974.

[7] K. F. Ryder, Jr., B. M. Juba, *Analysis of the Educational Personnel System: VI. Staffing Patterns in U.S. Local Public Schools*, R-1342-HEW, February 1974.

[8] D. H. Greenberg, J. J. McCall, *Analysis of the Educational Personnel System: VII. Teacher Mobility in Michigan*, R-1343-HEW, February 1974.

[9] S. J. Carroll, *Analysis of the Educational Personnel System: VIII. The Market for Teachers*, R-1344-HEW, February 1974.

Governance, research is continuing on the role of collective bargaining in the educational personnel system.

C. *RESEARCH ON WELFARE PROBLEMS*

Recent Rand research on welfare problems has focused on the causes of dependency, forecasting future needs for public assistance, and the value of benefits received by clients.

1. *The Characteristics of Welfare Dependency in New York*

The City of New York funded the New York City-Rand Institute from 1972 to 1975 to study the characteristics and causes of welfare dependency. The project, directed by David Lyon, was designed to improve understanding of welfare dependency in New York City and to generate detailed, up-to-date information on recipients of public assistance for use in the design of new welfare policies.[1-6] The project was based primarily upon machine-readable case record files maintained by the Department of Social Services.

The project encompassed eleven different studies of welfare dependency; design of a monthly caseload prediction model; analysis of long-term (six-year) caseload dynamics; design of automated procedures for generating periodic statistical profiles of the City's caseload; analysis of variation in welfare participation rates among the eligible poor; evaluation of alternative shelter allowance policies; evaluation of job training and employment programs for welfare recipients; design of a micro-simulation model to assess the impact of alternative welfare

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[1] I. S. Lowry, J. M. Gueron, K. M. Eisenstadt, *Welfare Housing in New York City*, R-1164-NYC, November 1972.

[2] C. P. Rydell, *Two Counts of Welfare in New York City: A Comparison of City and Census Data for 1969*, R-1179-NYC, December 1972.

[3] D. M. DeFerranti, S. Leeds, J. A. Grundfest, V. Leach, P. Parker, L. L. Prusoff, *The Welfare and Nonwelfare Poor in New York City*, R-1381-NYC, June 1974.

[4] C. P. Rydell, T. Palmerio, G. Blais, D. Brown, *Welfare Caseload Dynamics in New York City*, R-1441-NYC, October 1974.

[5] D. W. Lyon, C. P. Rydell, M. D. Menchik, *Welfare Policy Research for New York City: Findings on the Dynamics of Dependency*, P-5566, December 1975.

[6] D. W. Lyon, *Welfare Policy Research for New York City: The Record of a Five-Year Project*, R-2119-RC, forthcoming.

reform proposals on the City's economy; analysis of hospital use rates among Medicaid-paid welfare recipients; assessment of the impact Health Maintenance Organizations have on hospital utilization; patterns of ambulatory care under Medicaid; and the impact of social services on welfare dependency.

The project has resulted in a series of research findings that provide a unique perspective on welfare dependency in large central cities.

2. *Multiple Welfare Benefits*

The Social and Rehabilitation Service, DHEW, funded a Rand team headed by David Lyon to study the level and incidence of multiple welfare benefits using data from New York City.

The project focused on the measurement of transfer program benefits received by AFDC-recipients in New York City. Benefits measured included public assistance, Medicaid-paid health care, housing, food stamps, child care, and social services. The unit of analysis was the AFDC welfare case. The researchers found that 44 percent of the income received by a welfare family comes from either in-kind benefits like Medicaid, food stamps, or child care, or nonwelfare sources like earnings or unemployment insurance. Eighty-three percent of the AFDC cases studied had incomes above the federal poverty line and 22 percent were above the BLS lower consumption budget. Benefit measurement was for cash and in-kind transfers actually received by each case rather than hypothetical benefit levels based upon administrative grant schedules.[1]

3. *Welfare for Unemployed Fathers*

The Social and Rehabilitation Service has funded the same team to study the determinants of participation in the national AFDC-Unemployed Fathers program. Supplementary questions involve the factors which affect decisions by states to offer the program, the impact of changing federal policies, and the relationship between AFDC-UF and unemployment insurance.

[1]D. W. Lyon, P. A. Armstrong, J. R. Hosek, J. J. McCall, *Multiple Welfare Benefits in New York City*, R-2002-HEW, August 1976.

4. *Public Employment and Welfare*

The Ford Foundation is supporting a study of characteristics that predispose a family to turn (or return) to welfare dependency, with special attention to the role of public employment programs in changing the frequency and duration of dependency. This project, headed by David Lyon, will draw upon research findings that emerged from longitudinal data files on welfare dependency.

5. *Economic Conditions and Welfare Caseloads*

The California Department of Benefit Payments has a recognized need for studies to determine the interrelationship between general economic conditions, unemployment, and the growth and decline of welfare cases, as represented by the Social Security, Food Stamp, Aid to Families with Dependent Children, and General Assistance programs. A Rand team led by economist David DeFerranti was asked to prepare a study which would provide better understanding of these interrelationships so as to permit improved program policy decisions relating to reduced welfare dependency, ensure that adequate funding is available to meet the needs of disadvantaged citizens, and generate a framework within which local jurisdictions will better be able to project their welfare expenditures. The study will also enhance welfare planning and policy formulation at the state and local levels through the development of a long-term (4-8 years) forecast of caseload size and composition in relation to changes in economic variables. Specifically, the project involved a survey and analysis of methods of welfare caseload projection either currently used by states or developed in the relevant literature. Primary emphasis was on the extent to which quantitative relationships between economic variables and caseload movement are or can be effectively used in this area to improve the administration of public assistance in California.[1]

A follow-on study by the same investigators for the same client probed the relationship of the California AFDC caseload and the state's

[1] A. F. Abrahamse, D. M. DeFerranti, P. D. Fleischauer, A. J. Lipson, *Welfare Caseload Estimating Techniques: A Survey and Evaluation*, R-1916-CDOBP, January 1976.

economy. The study established a strong and direct relationship between indicators of economic conditions (e.g., unemployment) and the caseload. Guidance on using findings to forecast caseload changes is presented.[1]

6. *Problems of the Minority Elderly*

The elderly are often thought of as a homogeneous group, and programs designed to aid them may reflect this bias. However, the characteristics of the elderly are as varied as those of younger people. Rand, in a study led by economist Duran Bell, conducted a review of the analytical literature on ethnic stratifications and peer-group differences among age-groups over 60, analyzing census files on these groups. The study was sponsored by the Administrating on Aging, HEW. The study provides current knowledge about the etiology, causation, and actual incidence of a number of problematic issues (e.g., housing, education, poverty) as they affect older people of different ethnic or income groups. It recommends awarding legal residency to all elderly people in the United States, an improvement on federal programs for elderly Indians who are off reservations, expansion of self-help programs for the elderly, and arranging for more service provision by people of the same ethnic minority as the client.[2]

III.2. EARLIER HUMAN RESOURCES STUDIES

In earlier years, Rand human resources research concentrated on the topics of equal opportunity and employment and manpower, as well as welfare.

A. *EQUAL OPPORTUNITY*

Much of the earlier work on race relations, discrimination, and equal opportunity is included in a book edited by Anthony Pascal.[3]

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[1] A report is forthcoming.

[2] D. Bell, P. Kasschau, G. Zellman, *Delivering Services to Elderly Members of Minority Groups: A Critical Review of the Literature*, R-1862-HEW, April 1976.

[3] A. Pascal, ed., *Racial Discrimination in Economic Life*, D. C. Heath & Co., Lexington, Massachusetts, 1972.

In it appear essays by Rand staff members and consultants such as Kenneth Arrow, Thomas Schelling, Finis Welch, Leonard Rapping, John McCall, and Albert Wohlstetter. Theoretical models treat labor and housing markets, while empirical analyses cover such subjects as income trends, the effects of minimum wage laws and discrimination in professional sports. Together they demonstrate that the application of social science theory and the techniques of statistical measurement can help to identify some of the causes of a complicated social problem and point the way toward possible remedies.

John McCall also published a book on this topic, based largely on research conducted at Rand. It presents two major innovations--one empirical, the other theoretical--in the study of income mobility and racial discrimination as they relate to economic growth. It examines income mobility empirically, by analyzing movements into and out of poverty in the U.S. during the 10-year period 1957-1966. The analysis is based on Social Security data for over one million individuals. The conventional, static view of income distribution is contrasted with this new dynamic analysis to give fresh insights into U.S. problems of poverty and income. The theoretical part of the study develops a stochastic theory of unemployment and racial discrimination incorporating the role of information and job search in explaining labor market behavior. Also, a model of racial discrimination is introduced that incorporates uncertainty and explicitly considers both employees' and employers' costs in the employment search.[1]

B. *EMPLOYMENT AND LABOR MARKETS*

Earlier studies of employment problems include research on labor markets--both in terms of accession to them by young workers and the internal structure of such markets--and on the evaluation of social programs that affect the employment of disadvantaged workers.

We have, for example, studied the general question of the transition from school to work. The Office of Economic Opportunity asked Rand to help in structuring its research program on youth employment

[1] J. J. McCall, *Income Mobility, Racial Discrimination, and Economic Growth*, D. C. Heath and Co., Lexington, Massachusetts, 1973.

problems, including an underlying framework for organizing analytical efforts, for assigning priorities to studies and data collection, and for mapping the relationship among youth employment programs and other anti-poverty activities. Rand's report presented a comprehensive and systematic treatment of the youth employment problem.[1] We also conducted an empirical investigation of the transition from student to jobholder, concentrating on the impact of a youth's part-time work experience on his choice of and earnings in his first part-time job.[2]

Another study examined the statistical relationships among job stability, firm and industry structure, and the workers' age, experience, race, and earnings, from Social Security data. The evidence was strong for separate racial promotion ladders.[3]

Rand prepared a summary report for OEO presenting policy and program recommendations on manpower program evaluation, youth employment opportunity, labor market impediments to disadvantaged workers, effects of national policy on the poor, and race differences in income.[4]

The Job Corps prepares disadvantaged young people for productive employment. In evaluating the Los Angeles program for women, a Rand team compared a new commuter program with the Center's traditional residential program in terms of three short-term indicators of long-term outcomes: cognitive gains, changes in work-relevant attitudes, and length of time at the Center. Indications were that a commuter-type program can effectively serve segments of the population not reached by residential programs.[5]

A study prepared for the California Department of Human Resources Development describes a plan for compensating California job agents--

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[1] S. J. Carroll and A. H. Pascal, *Youth and Work: Toward a Model of Lifetime Economic Prospects*, RM-5891-OEO, April 1969.

[2] S. J. Carroll, *Part-Time Experience and the Transition from School to Work*, R-575-OEO, October 1970.

[3] A. J. Alexander, *Structure, Income and Race: A Study in Internal Labor Markets*, R-577-OEO, October 1970.

[4] A. H. Pascal, *Enhancing Opportunities in Job Markets: Summary of Research and Recommendations for Policy*, R-580-OEO, March 1971.

[5] S. J. Carroll, D. H. Greenberg, P. O. Katsky, *Evaluation Results for the Los Angeles Women's Job Corps Center*, R-745-OEO, September 1971.

employment specialists who work with disadvantaged workers--through an incentive pay system. Incentive rewards depend upon improvements in clients' earnings brought about through services provided by job agents. The standards against which job agents' performances are judged are predictions of how long their clients would have been unemployed and what their wages and job stability would have been had they not received job agent services. The methodology used to develop the incentive pay system can also be used to evaluate the effectiveness of a variety of manpower programs as well as other "case responsible" personnel within the manpower system.[1]

C. *WELFARE*

Rand's earlier research on welfare included *Population Growth and Poverty*, which assessed the foreseeable need for public assistance to the poor over the next three decades, and ascertained how this need would differ if the American birth rate were to continue at its current low level. Results indicated that the aggregate needs of the poor are not very sensitive to different population growth rates.[2]

Negative Income Tax proposals stimulated a good deal of research at Rand. An early study examined the economic effects of alternative income maintenance programs, considering male recipients' work or leisure choices, using a sample of about 6000 male household heads under 62 with varying levels of wage and nonemployment income. The proposed program would, the authors concluded, result in an appreciable though economically tolerable reduction in the supply of low-wage male labor, especially in New York City.[3,4]

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[1]F. W. Blackwell, D. H. Greenberg, A. J. Lipson, B. Rostker, S. T. Wolfberg, *Performance Rewards for Services to the Employable Poor: A Proposed Incentive Pay System for California Job Agents*, R-1028-HRD, June 1972.

[2]D. H. Greenberg, *Population Growth and Poverty*, R-1034-CPG, February 1972.

[3]D. H. Greenberg, M. Kosters, *Income Guarantees and the Working Poor: The Effect of Income Maintenance Programs on the Hours of Work of Male Family Heads*, R-579-OEO, December 1970.

[4]D. H. Greenberg, *Income Guarantees and the Working Poor in New York City: The Effect of Income Maintenance Programs on the Hours of Work of Male Family Heads*, R-658-NYC, March 1971.

In the past, the Economic Development Administration sponsored a substantial program of research--some of which is just now emerging--on the response by intended recipients to various types of income maintenance programs. The research included basic explorations of labor supply in the context of a model of household decisionmaking. Of particular interest also were the regional determinants and the regional consequences of reactions to negative income tax and related schemes.[1]

The State of Illinois also funded research aimed at understanding the links between employment, migration, and welfare dependency in the Chicago metropolitan area.[2]

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[1] D. H. Greenberg, *Problems of Model Specification and Measurement: The Labor Supply Function*, R-1085-EDA, December 1972; P. A. Morrison, *Migration from Distressed Areas: Its Meaning for Regional Policy*, R-1103-EDA/FF/NIH, October 1973; J. I. DaVanzo and D. H. Greenberg, *Suggestions for Assessing Economic and Demographic Effects of Income Maintenance Programs*, R-1211-EDA, June 1973; D. N. DeTray, *A General Economic Framework for Welfare Reform Analysis*, R-1346-OEO, July 1973; J. I. DaVanzo, D. N. DeTray, D. G. Greenberg, *Estimating Labor Supply Response: A Sensitivity Analysis*, R-1372-OEO, December 1973; J. F. Cogan, *Labor Supply and the Value of the Housewife's Time*, R-1461-OEO/EDA/RF, April 1975; J. R. Hosek, *Unemployment Patterns Among Individuals*, R-1775-EDA, August 1975; D. H. Greenberg and J. R. Hosek, *Regional Labor Supply Response to Negative Income Tax Programs*, R-1785-EDA, February 1976.

[2] G. L. Brunner, *Reason for Income and Employment Differentials in Chicago*, R-1099-IISP, March 1973; I. N. Fisher and S. Purnell, *The Population Eligible for Welfare in the Chicago Metropolitan Area: The Population at Risk*, R-1387-IISP, September 1973; I. N. Fisher and S. Purnell, *The Connection Between Migration and Welfare Dependency in the Chicago Metropolitan Area*, R-1388-IISP, September 1973; I. N. Fisher, *The Impact of Migration on the Chicago Metropolitan Population*, R-1389-IISP, September 1973.

IV. CONCLUSION: WHAT HAVE WE LEARNED ABOUT EDUCATION AND ABOUT HUMAN RESOURCES POLICIES?

Many of the people who started Rand's education and human resources research nearly a decade ago were economists. In the education field they were attracted to the type of input/output statistical analysis exemplified by the *Equal Educational Opportunity Survey* prepared by James Coleman and others. This study showed that differences in school resource levels or resource use had relatively little effect on students' test scores in reading or math.

This interest led them to survey what was known about school effectiveness. The end product, *How Effective is Schooling?*, summarized what economists, political scientists, psychologists, program evaluators, and teachers had found out about factors affecting school outcomes. The general finding was that except for general intelligence and family socioeconomic status, no spending level, no type of resource use, no curriculum, no differences in makeup of classmates, no teaching method, and no form of district, school, or classroom organization consistently affected measured student outcomes across different types of schools.

These findings did not, of course, imply that all educational activities were fruitless. It did imply that no methods were clearly superior to others over time and place.

This then led us to inquire why or whether these rather puzzling results were true. The Rand Change Agent study (pp. 14-15) allowed us to investigate innovative projects in some 225 school districts. We found again that level of funding, type of curriculum, or size of district were not important. But extensive interviews with teachers and administrators indicated that many projects were never actually implemented because they were not consistent with the values, interests, or abilities of participating districts and schools. What seemed to count in successfully implementing projects was school district and principal commitment, a reasonably ambitious extent of change, and a well-developed strategy for putting the project into action. This strategy normally included adaptive planning which adjusted to the realities of the local

site, staff training keyed to the local setting, and local staff participation in developing curriculum materials. Successful projects were marked by mutual adaptation--the project, the school, and the host site all changed in the process.

These results helped to explain the somewhat mysterious findings of *How Effective is Schooling?* One reason that no approaches analyzed there seemed to work consistently was, we concluded, differences in the ability or willingness of schools and school districts to support or carry out educational improvements. More recent Rand research on school district behavior (pp. 15-16) indicates that many districts focus on maintaining the bureaucratic status quo in the face of external and internal pressures, while other districts faced by the same pressures attempt to develop systematic change processes. These differences between districts could also account for some of the seemingly paradoxical findings of *How Effective is Schooling?*

Rand's findings in educational evaluation are broadly consistent. Programs like performance contracting (pp. 6-7) and the voucher demonstration (pp. 7-8) probably failed largely because they were out of tune with the realities of school district behavior. On the other hand, programs like the Los Angeles School Preferred Reading Program (pp. 10-11) apparently owed the successes they achieved to a supportive atmosphere created by the district and the school principal, and to the freedom allowed each school to choose its own reading methods and curriculum implementation strategies.

School finance, another main interest of Rand research, has tended in the past to be a rather specialized preserve of school finance experts. Some Rand studies have broken new ground in both theoretical and empirical findings. The theoretical work showed how different forms of state or federal aid formulas affect the spending behavior of local school systems. The *Serrano v. Priest* decision led to empirical research on both the effects of expenditure equalizing and the impact of increased resources on school district spending patterns (pp. 17-20). Somewhat surprisingly, we found that in California, a statewide leveling of school spending would not markedly affect the distribution of funds to the poor. Property-rich districts often have poor children, and property-poor districts often have middle-class children.

Our findings about how school districts spend additional money were also somewhat surprising, in view of the oft-expressed statement that such funds go largely to staff wage increases. On the basis of Michigan and California data, we found that less than one-fourth of the new money went for salary increases. Much of the rest was devoted to smaller classes and specialist teachers.

Taken together with our knowledge about the uncertain educational effects of higher spending, these data do not build a strong argument for school finance equalization, but do indicate that schools actually use new money to buy new resources. The critical policy issue is how those resources are used. Our research now seems to point toward funding districts that demonstrate effective support for better schools. It also points to support for proven methods of effective implementation, based on decentralized authority for planning and operations, and to effective staff training. The unsolved practical problem is how to apply such policies to thousands of school districts at very different stages of managerial development, all of them deserving of fair treatment from state and federal education authorities. Our research raises questions about whether the districts most in need of change may be least able to use resources effectively for self-improvement.

The relationship between school and work forms a link between Rand educational research and human resources research. Our studies of mid-life career redirection, youth policy in transition, and education in relation to technical change (pp. 31-34) show consistently that there is growing need for better work-related education, and indicates the inadequacy of much of the career education now provided by the educational system. Resources and facilities to provide better job-related training for young people and adults should be available in light of declining school attendance and large supplies of teachers. Unfortunately, little is known either about the nature and extent of demand for work-related education or reeducation, or about the effectiveness of the different programs now offered.

Our study of the teacher labor market clouds the broader issue somewhat. The research shows that the current teacher surplus may start to decline by the end of the 1970s, which is good for teachers

but could reduce the trained teacher pool available for reeducation tasks.

In the welfare field, we have found through a substantial program of studies that it is possible to forecast welfare caseloads accurately because they are closely related to general economic conditions and to the size of the benefit payments (p. 37).

Income maintenance proposals, which are designed to help the working poor, will tend to reduce somewhat the amount of work offered by the eligible population. This in turn will affect the labor supply in some regions, notably New York City (p. 41).

Our research has also confirmed that a major underlying cause of poverty that leads to welfare and income maintenance proposals is discrimination. It affects both the real job opportunities and the perceptions of opportunities by both young and old workers (pp. 38-39).

In retrospect, it appears that Rand probably underestimated the time and effort required to build the necessary experience in fields as complicated as education and human resources policy. The costs of learning were not trivial, but in recent years the findings of our work appear to have validated the costs and frustrations of this apprenticeship. On a number of topics, particularly in the areas of school effectiveness, the implementation of change, educational evaluation, finance, education and work, and welfare policy studies, we have learned a great deal about the functioning and limitations of complex social systems, and about the usefulness of various policy instruments in improving the capacity of these systems to serve the public. We have transmitted that knowledge to Rand's clients and a broader public, with generally useful results for public policy.

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